

REMARKS

This Amendment, submitted in response to the Office Action dated December 12, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As a preliminary matter, claims 3 and 21 have been objected to for informalities. Claim 3 has been amended as indicated above. With respect to claim 21, Applicant respectfully submits that claim 21 is in compliance with 37 C.F.R. § 1.75(c) and MPEP 608.01(n). In particular, claim 21 which refers to more than one other claim ("multiple dependent claim") refers to such other claim in the alternative only. Therefore, the objection to claim 21 should be withdrawn. Furthermore, since the Examiner has failed to treat claim 21 on the merits, any subsequent Office Action should be made on a non-final basis.

Claims 1-33 are pending in the present application. Claims 6, 13, 18, and 28 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Watanabe (US 6325537B1). Claims 7, 14, 19, 26 and 29 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Nambu et al. (US 6196715B1). Claim 25 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe. Claims 2, 5, 8, 11, 16, 23, 30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe in view of Pattee (US 6142667). Finally, claims 1, 3-4, 9-10, 12, 15, 17, 20, 22, 24, 27 and 31-33 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Nambu in view of Pattee. Applicant submits the following in traversal of the rejections.

In a majority of the Examiner's rejections, the Examiner merely reiterated the language of the claims without particularly establishing where the claimed elements are taught in the prior

art. The burden is upon the Examiner, and not the Applicant, to establish that the claimed elements are anticipated or made obvious by the prior art. Due to the ambiguity of the Examiner's rejections, Applicant respectfully requests that any subsequent Office Action be made on a non-final basis. Furthermore, if a subsequent Office Action is issued, Applicant respectfully request that the Examiner more particularly cite where the claimed elements are taught in the prior art.

Rejection of claims 6, 13, 18, and 28 under § 102(e) as being anticipated by Watanabe

Watanabe teaches an X-ray apparatus including an X-ray detector, an X-ray generator and a C-shaped arm. See Watanabe claim 1. The X-ray apparatus is fixed to the ceiling of the room in which the apparatus is placed. Col. 6, lines 32-34. The X-ray generator is rotated to achieve imaging in an oblique direction, without sliding or rotating the C-shaped arm. Thus, the limit to the slide angle range can be substantially eliminated without degrading accessibility, and various positioning is achieved exactly and easily. See abstract.

Claim 6

The Examiner states that Watanabe col. 6, lines 3-39 teaches the elements of claim 6. Claim 6 describes a two dimensional radiation image detection device capable of recording a radiation image equipped with *an angular signal output means* that outputs an *angular signal* which represents *the degree of tilt of the radiation emitted from a radiation source* in relation to the detection surface of the radiation image detection device.

The Examiner appears to be citing X-ray generator 12 for teaching a radiation source. It appears that the Examiner is citing planar X-ray detector 16 for teaching the claimed angular signal output means. However, upon viewing the respective column and lines cited by the

Examiner, there is no indication that planar X-ray detector 16 outputs an angular signal which represents the degree of tilt of the radiation emitted from a radiation source. In particular, there is no indication as to the function of planar X-ray detector 16, other than its ability to be positioned and moved. Since the Examiner has not established that all of the elements of claim 6 are taught in the prior art, claim 6 and its dependent claims should be deemed patentable.

To the extent the Examiner contends that the angle sensor maybe be inherent, Applicant submits that relational aspects between a source and detector can be implemented in the mechanical drives and need not include the angle sensor.

Claim 13

The Examiner states that Watanabe teaches that the image detection device comprises a stimuable phosphor sheet. However, the Examiner has not established where this is taught in the prior art. Since the Examiner has not met the burden of establishing anticipation, and the reference only refers to an X-ray detector generally, for at least this reason, claim 13 is not anticipated.

Furthermore, there is no indication of a stimuable phosphor sheet throughout the specification of Watanabe. Therefore, claim 13 should be deemed patentable.

Claim 18

Claim 18 describes that the image detection device is located at a distance from a subject being imaged. Again the Examiner merely reiterates the language of the claim without establishing where the claimed elements are taught in the prior art.

It is unclear what is being cited for teaching an image detection device since it appears that planar X-ray detector 16 was previously cited for teaching the angular signal output means and X-ray generator 12 was previously cited for teaching the radiation source.

Since the previous elements of Watanabe were previously cited for teaching other elements, the Examiner should cite other art for teaching the elements of claim 18.

Assuming the Examiner is citing planar X-ray detector 16 for teaching the image detection device of claim 18, upon viewing Fig. 2, it is apparent that planar X-ray detector 16 is not located at a distance from the object being imaged, but directly abuts the subject. Furthermore, it would be clear to one of ordinary skill in the art that an X-ray generator 12 is not an image detection device. For the above reasons, claim 18 should be deemed patentable.

Claim 28

Claim 28 describes that angular signal output means is an electronic level or a projection style angle sensor. The Examiner cites Fig. 14 for teaching the elements of claim 28.

Fig. 14 is a block diagram showing the configuration of a control circuit of the X-ray diagnosis apparatus as whole. The X-ray apparatus includes a bed, a support section, a setting section, a display section and a control section. The bed has a drive section for controlling movement of the bed. The support section is a mechanism for rotatably attaching the X-ray generator to the C-shaped arm and to the link mechanism. An output from an X-ray tube rotary drive section is fed to an X-ray tube rotational position detection section. An output from the X-ray tube rotational position detection section is delivered to an X-ray tube rotational amount calculation section in the control section. Based on the calculation result of the X-ray tube rotational amount calculation section, the X-ray tube rotary drive section feed-back controls the

rotational position of the X-ray tube. See col. 11, lines 31-61. There is no indication that Fig. 14 teaches the angular signal output means (planar X-ray detector 16 as appears to be cited by the Examiner) of claim 28.

Furthermore, there is no indication that planar X-ray detector 16 is an electronic level or a projection style angle sensor. Therefore, claim 28 should be deemed patentable. In any event, because base claim 2 is not anticipated by Watanabe, dependent claim 28 also cannot be anticipated.

Rejection of claims 7, 14, 19, 26 and 29 under § 102(b) as being anticipated by Nambu

Nambu teaches an X-ray diagnostic system including an X-ray generator irradiating an X-ray toward a subject, and a planar-type X-ray detector detecting the X-ray passing through the subject and outputting two dimensional imaging signals based on the detected X-ray. See abstract.

Claim 7

Claim 7 describes a two dimensional radiation image detection device capable of recording a radiation image equipped with a *command means* that generates an *exposure command* to the radiation source when the *tilt* of the radiation to be emitted by a radiation source in relation to the detection surface of the radiation image detection device is substantially perpendicular.

The Examiner cites Nambu col. 18, lines 31-68 and col. 27, lines 10-68 for teaching the elements of claim 7. The Examiner appears to be stating that since the system is maintaining relationships between X-ray source and detector in a perpendicular orientation, then the X-ray is exposed when the devices are perpendicular.

However, the respective column and lines cited by the Examiner states that with respect to the scan orbit, the movement of the detector should be controlled so that it is always perpendicularly oriented to the tube (i.e. its detection surface is perpendicular to the central irradiation direction of irradiated X-rays). If the tube 12 is moved along a circular arch-like orbit from a solid line position to a two-dotted line position, then the detector 14 is also moved along a circular arch-like orbit from the solid line position to the two-dotted line position. Col. 18, lines 33-45.

There is no indication of a command means that generates an exposure command to the radiation source (tube 12) when the tilt of the radiation emitted by a radiation source in relation to the detection surface (detector 14) is substantially perpendicular. Therefore, claim 7 should be deemed patentable.

Claim 19

Claim 19 describes that the image detection device is located at a distance from a subject being imaged. However, the Examiner has not established where this is taught in the prior art. Therefore, claim 19 is not anticipated.

Claim 29

The Examiner states that Nambu teaches that the angular signal output means is an electronic level, citing Fig. 14 in support. Fig. 14 illustrates the attachment of a tube and a detector to a C-shaped arm. The Examiner has not established where an angular signal output means is taught, let alone, that the angular signal output means is an electronic level. Therefore, claim 29 should be deemed patentable. Moreover, because base claim 6 is not anticipated by Nambu, then dependent claim 29 also is not anticipated by Nambu.

Rejection of claim 25 under § 103(a) as being unpatentable over Watanabe

Claim 25 describes a radiation image detecting device comprising a scattered ray removal grid board adjacent to the radiation image detection device which prevents the occurrence of false images and enhances image reproducibility after radiation has been transmitted through a subject.

The Examiner cites Watanabe for teaching the elements of claim 25, however, the Examiner states that Watanabe does not teach a grid on the radiation image detection device. Regardless, the Examiner states that it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to adapt a well known anti-scatter grid on a detector in order to provide a better image. To the extent that the Examiner is citing official notice in connection with this feature, Applicant respectfully requests that an appropriate reference suggesting combinability with Watanabe be provided.

However, there is no reason why Watanabe should be modified to include a scattered ray removal grid board. In particular, modifying Watanabe to include a scattered ray removal grid board would require a substantial reconstruction of the system of Watanabe (MPEP 2143.01), since there does not appear to be a location for placing the scattered ray removal grid board adjacent to the radiation image detection device. See Fig. 2. The Examiner's reasoning appears to be based on pure speculation and impermissible hindsight. Therefore, claim 25 should be deemed patentable.

Rejection of claims 2, 5, 8, 11, 16, 23, 30 under § 103(a) as being unpatentable over Watanabe in view of Pattee

Pattee teaches a mobile C-arm assembly having a torsionally counterbalanced lateral rotation mechanism. See Field of the Invention. The counterbalancing mechanism overcomes

an unbalanced condition produced when the center of mass of the rotatable structure is separated by a large distance from the axis of lateral rotation. Col. 2, lines 46-54. The support structure usually rests on wheels so that the apparatus can be wheeled from room to room. Col. 1, lines 38-43. Furthermore, the structure is heavy enough and has a large enough footprint to avoid tipping over upon lateral rotation of the C-arm and L-arm about the axis of lateral rotation to prevent the center of mass of the equipment from shifting dramatically. Col. 2, lines 1-5.

Claim 2

The Examiner states that Watanabe teaches a radiation imaging system comprising a radiation source and a two dimensional radiation image detection device that records a radiation image by detecting the radiation emitted from said radiation source and is transmitted through a subject. However, the Examiner has not particularly established where this is taught in the prior art. X-ray generator 12 appears to be cited for teaching a radiation source and planar X-ray detector 16 appears to be cited for teaching a two dimensional radiation image detection device.

Claim 2 further describes that both of the elements are structured to be carriable and further comprises an *angular signal output means* that outputs an angular signal which represents the degree of tilt of the radiation emitted from said radiation source in relation to the detection surface of said radiation image detection device (Fig. 2) and a *tilt adjustment means* that adjusts said tilt of the radiation in relation to the detection surface of the radiation image detection device to become substantially perpendicular by changing the tilt angle of said radiation image detection device based on said angular signal output from said angular signal output means (col. 6, lines 3-39).

It is unclear what is being cited for teaching an angular signal output means, since Watanabe does not appear to disclose such an apparatus explicitly or inherently for the reasons set out in claim 6.

The Examiner states that Watanabe does not teach that the system is carriable and cites Pattee to cure the deficiency. The Examiner states that Pattee teaches a C-arm X-ray imaging system having wheels, therefore it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to make *movable* a C-arm X-ray imaging system in order to take an X-ray image at any convenient location for patient and X-ray taking personnel.

However, claim 2 not does merely state that the system is movable, but that the system is carriable. Although the system of Pattee is movable from room to room, upon viewing the structure of Pattee (see Fig. 2), it does not appear that the system of Pattee is carriable. Furthermore, the heaviness requirement of Pattee, which is needed to prevent shifting of the center of mass of the equipment (col. 2, lines 1-5), further evidences that the system of Pattee is not carriable.

Furthermore, the structure of Watanabe is *fixed* in a room. The support structure is fixed to a ceiling or floor so as to be rotatable about the support column axis. A rail is provided on the ceiling so that the apparatus may be movable in one or two directions. Col. 6, lines 30-32. Therefore, making Watanabe portable, is contrary to what is taught in Watanabe and could result in errors in rotation about the support axis. The Examiner's reasoning appears to be a result of impermissible hindsight. Therefore, claim 2 and its dependent claims should be deemed patentable.

Since claims 8 and 30 describe similar elements, they should be deemed patentable for the same reasons.

Claim 5

The Examiner states that Watanabe teaches a shift means that enables horizontal movement of the radiation image detection device, citing Watanabe Fig. 9 in support. However, claim 5 also describes that the shift means is portable, which the Examiner has not established is taught in the prior art. As previously indicated, it would not be obvious to make Watanabe portable. Any indication by the Examiner of the obviousness of such a modification would merely be based on impermissible hindsight. Therefore, claim 5 should be deemed patentable.

Claim 11

The Examiner states that Watanabe does not teach that the image detection device comprises a stimutable phosphor sheet. However, the Examiner has not established where a stimutable phosphor sheet is taught in the prior art.

Furthermore, the Examiner's rejection of claim 11 is contrary to the Examiner's earlier rejection of claim 13 in which the Examiner stated that Watanabe *discloses* a stimutable phosphor sheet.

Regardless of the Examiner's inconsistency, upon reading the specification of Watanabe there is no indication of a stimutable phosphor sheet. Therefore, claim 11 should be deemed patentable.

Claim 23

The Examiner states that Watanabe does not teach a grid on the radiation image detection device. The Examiner also states that it would have been obvious to an artisan or ordinary skill

in the art at the time the invention was made to adapt well known anti-scatter grid on detector in order to provide a better image.

As previously indicated, there is no reason why Watanabe should be modified to include a scattered ray removal grid board. In particular, modifying Watanabe to include a scattered ray removal grid board would require a substantial reconstruction of the system of Watanabe (MPEP 2143.01), since there does not appear to be a location for placing the scattered ray removal grid board adjacent to the radiation image detection device. See Fig. 2. The Examiner's reasoning appears to be based on pure speculation and impermissible hindsight. Therefore, claim 23 should be deemed patentable.

Rejection of claims 1, 3-4, 9-10, 12, 15, 17, 20, 22, 24, 27 and 31-33 under § 103(a) as being unpatentable over Nambu in view of Pattee

Claim 1

The Examiner states that Nambu teaches the elements of claim 1 including a radiation source and a two dimensional radiation image detection device that records a radiation image by detecting the radiation emitted from the radiation source. It appears the Examiner is citing X-ray tube 12 for teaching a radiation source and is citing detector 14 for teaching a two dimensional radiation image detection device.

Claim 1 further describes an angular signal output means and a tilt adjustment means. The Examiner cites col. 18, line 31+ for teaching the angular signal output means. The respective column and lines cited by the Examiner describes the perpendicular orientation of the detector to the tube. The scan orbit controls the movement of the detector so that it is always perpendicularly orientated to the tube. Assuming the Examiner is citing the scan orbit for teaching the angular signal output means, there is no indication that the scan orbit outputs an

angular signal representing the degree of tilt of the radiation emitted from the radiation source in relation to the detection surface of the radiation image detection device.

The Examiner cites col. 27, line 10+ for teaching the tilt adjustment means. The respective column and lines cited by the Examiner describes the correction of the spread of X-ray beams and/or tilting angles of the detector based on a well-known cos term. However, there is no indication that the cos term adjusts the tilt of the radiation in relation to the detection surface of the radiation image detection device to become substantially perpendicular by changing the tilt angle of the radiation source based on the *angular signal out from the angular signal output means*. In particular, there does not appear to be a relationship between the cos term and the scan orbit (angular signal output means as cited by the Examiner).

For the above reasons, claim 1 and its dependent claims should be deemed patentable. Since claims 9 and 31 describe similar elements, they are patentable for the same reasons.

Claim 3

Claim 3 describes portable radiation imaging system comprising a radiation source and a two dimensional radiation image detection device that records a radiation image by detecting the radiation emitted from said radiation source and is transmitted through a subject. The Examiner states that Nambu teaches these aspect of claim 3, however, the Examiner has not established where this is taught in the prior art.

Claim 3 further describes a command means (computer) that generates an exposure command to said radiation source when the tilt of the radiation to be emitted from said radiation source in relation to the detection surface of said radiation image detection device is substantially perpendicular (col. 18, line 31+ and col. 27, line 10+). The Examiner notes that since the system

is maintaining relationships between the X-ray source and the detector in a perpendicular orientation, that an X-ray is exposed when they are perpendicular.

However, it is unclear what computer is being cited for a command means. A computer is mentioned on col. 26, lines 35-39 for teaching that prior to an image recombination process, projection data acquired are subject to a mathematical removal operation by a computer incorporated in the control/processing apparatus. A computer is also mentioned on col. 27, lines 46-51 in which calculation of removal of movement components from a plurality of frames of projection data is performed by a computer incorporated in the control/processing apparatus.

However, there is no indication that the computer generates an exposure command to the radiation source when the tilt of the radiation to be emitted from the radiation source in relation to the detection surface of the radiation image detection device is substantially perpendicular.

The respective column and lines cited by the Examiner describes the perpendicular orientation of the detector in relation to the tube, however, this is performed by a scan orbit. There is no indication that the scan orbit generates an exposure command. Therefore, claim 3 and its dependent claims should be deemed patentable.

Claim 15

The Examiner states that Nambu teaches that the image detection device is located at a distance from the subject being imaged. However, the Examiner has not established where this is taught in the prior art. For at least this reason, claim 15 should be deemed patentable. Since claim 17 describes similar elements, it is patentable for the same reason.

Claim 20

The Examiner states that Nambu teaches that the tilt adjustment means comprises screws or geared teeth. Again, the Examiner does not indicate where this is taught in Nambu but merely reiterates the language of the claims. Upon viewing Nambu, there is no indication of screws or geared teeth with respect to a tilt adjustment means. Therefore, claim 20 should be deemed patentable.

Claim 27

The Examiner states that Nambu teaches that the angular signal output means is an electronic level, citing Fig. 14. Fig. 14 illustrates the attachment of the tube and the detector to the C-shaped arm. Col. 6, lines 57-58. There is no indication that the angular signal output means (scan orbit as cited by the Examiner) is an electronic level. Therefore, claim 27 should be deemed patentable.

Claims 32 and 33

The Examiner states that Nambu teaches that the angular signal output means is integral with the two dimensional radiation image detection device. Again, the Examiner merely reiterates the language of the claim without particularly citing where this is taught in the prior art. Regardless, there is no indication that a scan orbit is integral with the detector 14. Therefore, claims 32 and 33 should be deemed patentable.

Applicant has added claims 34-36 to provide a more varied scope of protection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

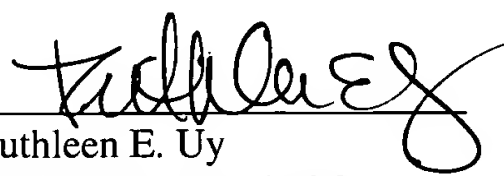
AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. APPLN. NO: 09/987,654

ATTORNEY DOCKET NO. Q66556

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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